MH-60S FLEET COMBAT SUPPORT HELICOPTER

The MH-60S Fleet Combat Support Helicopter is the replacement for the current Navy CH-46D, which is nearing or exceeding its original service life. The MH-60S is designed to provide the Navy's Combat Logistic Force with: (1) responsive vertical replenishment (VERTREP); (2) vertical onboard delivery; (3) airhead support; and (4) day/night Amphibious Task Force search and rescue (SAR) services. Secondary missions include Special Warfare (over water) Support, aero medical evacuation, and noncombatant evacuation. A second mission configuration of the MH-60S is being designed to support: (1) Combat Search and Rescue/Special Warfare (over land) Support (CSAR/SWS); (2) Anti Surface Warfare; and (3) Aircraft Carrier Plane Guard/SAR. A third mission configuration was approved in May 2000 to support the Airborne Mine Countermeasures (AMCM) mission.

The MH-60S is an Army UH-60L Black Hawk airframe incorporating Navy Seahawk marinized GE T-700 engines, folding rotor head and tail pylon, transmission/drive train, stabilator, and flight controls. The MH-60S shares with the Navy MH-60R helicopter a Common Cockpit, which consists of multi-functional displays, key sets, and a complex client-server based tactical data processing system. The MH-60S avionics will include: (1) dual UHF/VHF transceivers; (2) inertial and Global Positioning System navigation; (3) night vision device-compatible heads-up displays; and (4) a ground proximity warning system. The aircraft will have provisions installed to incorporate a future CSAR mission kit consisting of tactical moving maps, Forward-Looking Infrared sensor with a laser range finder/designator, crew-served side suppression weapons, Hellfire missiles, forward firing guns/rockets, and an integrated self-defense system. The aircraft will also have provisions installed to incorporate AMCM sensors and destructors, individual programs that are currently in development.

BACKGROUND INFORMATION

Contractor flight tests commenced in January 2000 and continued into May. Late delivery of the aircraft from Sikorsky, technical problems with the Common Cockpit, and immature Lockheed Martin software prompted the Navy to restructure the program in October 2000. The restructured program provided an additional 185-flight hours to test the Common Cockpit, testing originally planned for the MH-60R program. The MH-60R program had incurred excessive schedule delays and could no longer support the original plan.

DOT&E designated the MH-60S as a covered system under Live Fire Test. An alternative LFT&E plan was approved in 1998 and a waiver from full-up, system-level testing was granted.

Congress was notified. The initial LFT&E strategy for the MH-60S (Vertical Replenishment version) required assessment of its combat survivability and potential for crew casualties. The strategy required that a recommendation be made for any necessary additional tests pertinent to the threats encountered in the CSAR and the AMCM missions. A panel of Navy, Army, and OSD experts convened in March 1999 and concluded that important data voids existed. DOT&E recognized that the data voids were common to all H-60 aircraft variants within the Navy and Army and proposed that the two Services coordinate their efforts and thus minimize cost. In response, a Joint Army/Navy LFT&E Test Program was established to address the data needs of the MH-60R, the MH-60S, and the UH-60M programs. The program takes advantage of the high degree of similarity between components and structure of Navy and Army variants of the H-60. Utilizing the resources and talents of both Services' vulnerability testing establishments, a number of usable H-60 components and structures have been collected including an operable YCH-60. The Services prepared an H-60 family LFT&E plan and initiated testing in 2001.

TEST & EVALUATION ACTIVITY

TECHEVAL commenced mid-May 2000 and was scheduled for completion in January 2001. Testing was hampered by immature hardware and software. DT was extended through the mid-July 2001 timeframe to certify the Common Cockpit for instrument meteorological conditions (IMC). Improper Tactical Air Navigation antenna switching and interference in the VHF Omni-directional Range/Instrument Landing System delayed successful IMC clearance certification until September 2001. The scheduled commencement of OPEVAL in August 2001 was delayed by IMC certification, as well as out-of-specification aircraft vibration and receipt of the DT/OT transition report. DOT&E approved the test plan for OPEVAL, which commenced in October 2001.

The May 2000 Operational Requirements Document Revision is being updated to include Joint Interoperability as a Key Performance Parameter and changes VERTREP endurance and Common Cockpit BIT parameters. The TEMP revision incorporating the AMCM mission will also reflect changes in the updated ORD revision. The TEMP is targeted for approval before Milestone III for the Fleet Combat Support Helicopter missions scheduled in June 2002.

The first tests under the Joint Army/Navy LFT&E test program included static flight control shots executed by the Army at Aberdeen Proving Ground in June 2001. These tests provided order of magnitude threat effect data to allow threat selection for dynamic flight controls tests to be accomplished at Naval Air Warfare Center – Weapons Division, China Lake in September 2001. This program differs from the extensive prior testing of the H-60 in that a large number of the tests will be conducted under dynamic conditions while the aircraft is in a 1G-hover condition. There is some risk, under these conditions, that the single operable test aircraft will be destroyed prematurely.

TEST & EVALUATION ASSESSMENT

Both contractor and DT testing demonstrated poor maturity and stability levels for the Common Cockpit system and the numerous navigation/communication systems that interface with it. This directly contributed to schedule delays by forcing the program into a test-fix-test evolution throughout the test period. A major restructure of the Lockheed Martin team and the insistence of the new Navy program manager to establish a tested baseline through imposition of strict configuration control of both software and hardware proved to be successful by June 2001. However, insufficient provisioning of spare

component parts for the Common Cockpit and delay in certifying the aircraft for instrument flight contributed to additional schedule delays.

The rapid development of the Common Cockpit system for installation in both the MH-60S and MH-60R proved to be a large technical challenge, even though it was based on contractor-off-the-shelf and government-off-the-shelf components. Development of a digitized glass cockpit is a complex task that demands strict configuration control measures be in place for timely, successful completion. Additional complexity will occur as AMCM and CSAR mission avionics and weapons are integrated into the Common Cockpit system in the future and the technical challenge should not be underestimated.

The out-of-specification aircraft vibration noted during DT just prior to OPEVAL was not anticipated. Although the Navy propulsion system had not been paired with the Black Hawk airframe before, the similarity of the Army propulsion system alleviated any excess vibration concerns during early development. The MH-60S out-of-specification vibration levels could not be dampened by adjustment of the cabin absorbers nor the existing centrifugal weights (bi-filers) at the main rotor. Because thousands of Black Hawk and Sea Hawk aircraft have been built, neither Sikorsky nor the Navy anticipated vibration problems of this magnitude. A prototype fix for the out-of-specification vibration levels is undergoing contractor testing and is showing promising results. A production version is scheduled to be installed and operationally tested prior to IOC of the aircraft.

Test data acquired from the Joint Live Fire test program funded by DOT&E have contributed to assessing the vulnerability of the aircraft. Though off to a good start with the static flight control tests at Aberdeen, the program depends greatly on a single operable YCH-60 ground test vehicle. If any of the tests destroy the vehicle prematurely, this program could be faced with either funding a new test article or terminating with insufficient data.

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